

# ULTRASONIC INSPECTION SYSTEM FOR CASTER ROLL INSPECTION



This equipment is for the ultrasonic inspection of cast rolls following a period of service but prior to machining them in a CNC lathe. The ultrasonic inspection is carried out using a single fixed **Water Column Coupled Probe (WCCP)** unit for the longitudinal shear wave flaw detection in both directions. See the reverse of this brochure.

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**Caster roll sizes up to 800mm diameter  
and a maximum length of 3500mm.**

**WCCP ultrasonic probe units.**

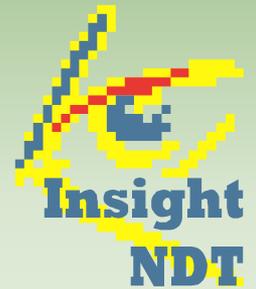
**Longitudinal ultrasonic shear wave testing.**

**Compression wave testing if required.**

**Can use any CNC lathe with a FANUC controller.**

**Fully automatic determination of machining profile  
to remove defects from the roll.**

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**Telephone**  
+44 (0)1981 541122

**Fax**  
+44 (0)1981 541133

**Email**  
Sales@InsightNDT.com

**Web Site**  
www.InsightNDT.com

**Insight NDT  
Equipment Ltd**  
The Old Cider Mill  
Kings Thorn  
Herefordshire  
HR2 8AW

**Directors**  
Mark Willcox BSc (Hons)  
Jiang Li BSc (Hons)

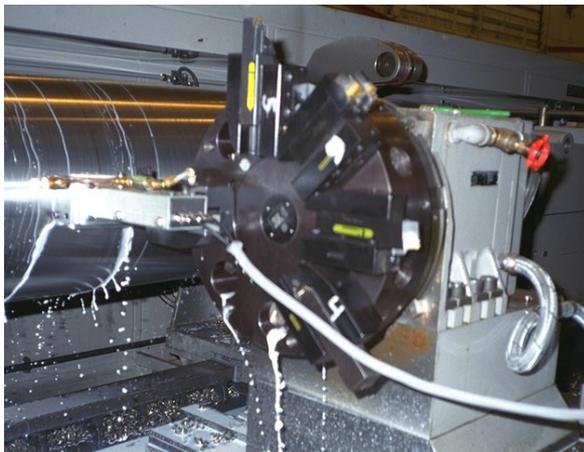
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771 3060 50

**Registration No.**  
4198815 England

**Registered Office**  
21 St Owen Street, Hereford,  
Herefordshire HR1 2JB

Roll inspection is necessary to ensure that rolls being returned to the hot plate mill following reconditioning are free from surface breaking and internal defects that may cause the failure of the roll whilst in service. This brochure describes the use of our Automatic Ultrasonic system for the inspection of Caster Rolls, and a scheme which uses the data obtained to directly control the complete renovation process.

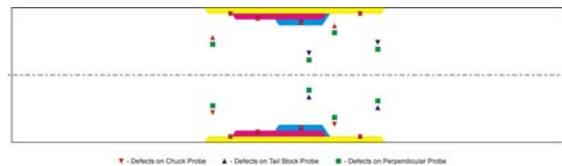
The ultrasonic inspection of the roll is carried out in a CNC lathe. After the roll barrel has been skimmed, to remove the working surface - which is a stainless steel cladding - to provide a suitable surface for ultrasonic inspection. The ultrasonic probe assembly fits into the CNC lathe tool turret, mounted in a standard machine tool post, and uses the lathe cutting fluid as the ultrasonic couplant. The probe assembly uses a gap scanning technique, where the probes' faces are kept at a 0.3mm gap from the surface of the roll; the fluid fills the gap to provide coupling of the ultrasound.



The CNC lathe operator initiates the test by entering the roll diameter and the barrel length into the system. This information will be used by the system to generate a CNC program which would position the ultrasonic probe assembly to maintain the 0.3mm gap and automatically select an appropriate roll RPM to ensure that the peripheral speed of the roll would be approximately 600mm/s.

A single pass of the roll whilst it is rotating is required for the ultrasonic inspection, this done by using the CNC lathe to provide a 10mm pitch helical scan of the roll barrel, scanning from the chuck end to the tailstock end. The computer section of the system is used to record the defects found by the ultrasonic system and calculate the depth and the position of each defect relative to the reference, which is the tailstock end of the roll barrel.

Based on the position and depth of the defects found, the computer will create a machining profile to completely remove the defects from the roll barrel. In the creation of this machining profile, the computer takes into account the requirement that each side of any cut-out should have a 30 degree angle, to facilitate the welding process. If two defects are less than 50mm apart then the land between them is also machined away to the depth of the deepest defect. This profile is presented to the machinist in the form of a roll machining graphic. This shows the relative position of each machining band each band being a circumferential cut of 6.5mm together with the volume of material to be removed and the deepest depth of defect, and is also presented in the form of a roll inspection report.



The machinist responsible for the roll could then decide if the roll has to be scrapped or reworked. If the decision is taken to rework the roll, the computer system can be instructed to take the required machining profile and convert it in to a program for the CNC lathe. This lathe program can be downloaded to the lathe's controller, and the program run

## Roll Inspection Software

The roll inspection software is designed to;

- Allow entry dimensions of the roll to be tested.
- Send an inspection CNC program to the lathe to scan the lathe using a threading cycle.
- Collect and collate the data from the ultrasonic instrumentation, so that a machining profile may be displayed.
- Post-process this machining profile to generate the CNC program to remove the defects found.

